

**SECTION III. THE ORE REGION OF THE HARS MOUNTAINS
AND THE SURROUNDING AREA**

Introduction

This section deals with the Hars Mountains and their surrounding area, within a sector enclosed by the cities of Halle, Magdeburg, Hana-nover, and Göttingen, and also including the copper-bearing shale regions of Mansfeld and Sangerhausen.

The text is subdivided as follows:

- I. Ore deposits of the Upper, Central and Southern Hars Mountains
- II. Ore deposits of the Lower Hars Mountains
- III. Copper-bearing shale of the western and southern foothills of the Hars Mountains
- IV. Sedimentary iron ore deposits in the northern Hars Mountains foothills (supplement)

The general regularities in the distribution of the ore deposits are discussed for each of these chapters. They are particularly instructive in the following areas:

a. In the Upper, Central and Southern Hars Mountains, around the Brocken massif, horizontal and vertical metallogenetic zones can be recognized. However, they are not inclosed by the Brocken granite in the form of aureoles, but rather as different successive streaks, rhythmically repeated around several centers (Clausthal, St. Andreasberg, Lauterberg-Hasserode-Hohne). The arsenopyrite deposits (Hasserode-Hohne, St. Andreasberg) must be considered as near the magma and with a high thermal value; thus, their primary variations in depth increase with the depth. In the areas of Clausthal, St. Andreasberg, and Lauterberg, the vertical zoning shows a pitch toward the southwest, away from the Brocken mountain. The surface outcroppings of the vein formations correspond to this feature. In cases of complete development, e.g., there follow, starting from the bottom, on top of one another, layers with predominantly carbonatic veins, quartz or quartz-and-pyrite, zinc

blende, galena, and barite. However, the primary variations in depth are probably caused not only by the distance from ore-giving magma, but also by differences in the solubility of the metals and by the temporal coincidence of the formation of fissures and temperature conditions favorable to precipitation. The veins were created as dis-tension disturbances simultaneously with the Upper Carbonaceous folding of the Paleozoic. The granite of the Brocken probably continues underground to the west and south. It certainly has its roots of uprising in the east, where the high-thermal deposits of Hasserode are located, and from there widens out to the granite of the Ilsestein in the northwest and the regular granular Brocken granite in the southwest. This shows some very interesting analogies to the situation prevailing in the Riesengebirge of the Sudeten range. In the area of St. Andreas-berg, the higher deposits are probably at the top of the hidden granite tongue, particularly close to the magma. Thus, the relationships between the deposits and the internal structure of the plutonic rock of the Brocken are more of a criterion for the distribution than their distance from the origin of the ore by itself.

b. The zonal arrangement is even more marked in the Lower Harz Mountains. The Rammberg granite shows decidedly acid differentiation products, also in pneumatolytical phase, and extends further to the south underneath a wide aureole. From the center to the periphery, there follow in succession a copper-arsenic-pyrite-wolframite zone, a galena-zinc blende zone, a siderite zone, an antimony zone, and a recent fluorite-barite zone. The long Neudorf-Strassberg vein penetrates the first three of the above aureole-like zones and thus is part of various zones in its different sections. Furthermore, the Variscan tectonic structures have determined the path of the mineralizers to a large extent. The displacement of the center of the ore-giving magma and telescoping and rejuvenation processes may also be the cause of the many complications in the vertical telescoping and the lateral changes in the filling of the vein sections.

The regularities which can be recognised in the ore-formation of the copper slate basins are altogether different. Here, paleogeographic conditions predominate, viz. climatological and orographic conditions at the time of the erosion of primary ore deposits on the adjacent continent, form and depth conditions, water temperature, salt content, CO₂ pressure, living conditions of the microorganisms capable of precipitating metal, etc. in the sedimentation basins. The main copper deposits of the Zechstein sea are clearly limited to the deep channels and to the deeper parts of secondary bays, while the shallower regions are covered by a zinc and lead zone. This zoning also exists in a vertical direction. With change in facies, these zones were displaced depending on the depth conditions. The so-called cobalt ridges probably were subject to ore precipitations by water circulating within the Permian limestone, which may have been heated additionally by a magmatic ridge running at greater depth.

The sedimentary iron ore deposits in the Northern Harz foothills do not show any relation to the deposits of nonferrous metals.

Table of Contents

(Note: The page references on the table of contents of the original are incorrect!)

Delimitation of the region

Geological summary

- I. Ore deposits of the Upper, Central, and Southern Harz Mountains
 - A. Pre-Carbonaceous deposits
 1. Sedimentary deposits in the Devonian ¹¹ Period
 2. The Rammelsberg ore deposits
 - B. Deposits of the Carbonaceous to Permian Periods
 1. The deposits
 - a) The Clausthal region
 - b) The Andreasberg region
 - c) The Lauterberg region
 - d) The Hasserode-Hohne region
 - e) Pyrite deposits of the mine "Drei Kronen und Ehart"
near Elbingerode
 2. General regularities in the Upper, Central and Southern Harz Mountains
 - a) Zonal arrangement
 - b) The ratio between lead and zinc
 - c) The silver content
 - d) The mechanism of motion of the Upper Harz veins
 - e) The age of the veins
 - f) Shape and extent of the ore-giving body of magma
- II. Ore deposits of the Lower Harz (Eastern Harz) Mountains
 1. The deposits
 2. General regularities in the Lower Harz
 - a) The Ramberg granite
 - b) Zonal origin

- c) The position of the veins in relation to the zones and distribution of the lode ores
- d) The question of erosion depth
- III. The copper slate of the Eastern and Southern Harz foothills
 - 1. The deposit areas
 - 2. Geological conditions, distribution of metal and origin of the deposits
- IV. Sedimentary iron ore deposits in the Northern Harz foothills
- V. Bibliography

Illustrations

- Fig. 1: The ore region of the Harz Mountains and their surroundings
- 2: Schematic drawing of the tectonic elements in the Upper Harz
 - 3: The Brocken massif and the ore deposits in its vicinity
 - 4: The veins of the Ramberg, the Auerberg, and Tilkenrode
 - 5: The deposit zones of the Lower Harz ore regions
 - 6: a) The depth of the Lower Permian limestone in the vicinity of the Eastern Harz Mountains
 - b) Copper content of the total seam in the vicinity of the Eastern Harz Mountains
 - 7: a) Paleographic picture of the Lower Permian limestone between the Harz and Kyffhaeuser Mountains
 - b) Copper content between the Harz and Kyffhaeuser Mountains
 - 8: Metal content of the copper slate as facies
 - 9: Displacement of the facies due to gradual flattening of the basin
(NOTE: This illustration is missing in original)
 - 10: The subterranean crystal vein (Langensalza) - Frankenhäusen - Wettin - (Dessau) on the basis of magnetic anomalies